

# PSSM1 vs SCC — Punnett Squares & Breeder Notes

This short guide summarises key differences between **PSSM1 (dominant)** and **SCC susceptibility (recessive)**, shows common Punnett squares, and gives quick breeder recommendations and a legend for interpreting genotypes/phenotypes.

## PSSM1 (Polysaccharide Storage Myopathy type 1)

- Inheritance: **Autosomal dominant** (GYS1 mutation; commonly reported as P1). - A single copy (N/P1) is sufficient to be considered at risk; P1/P1 may have more severe signs. - Clinical: muscle stiffness, tying-up, reduced performance. - Testing: direct DNA test (Clear = N/N; Carrier/Affected = N/P1; Homozygous = P1/P1). - Breeding note: Avoid using affected horses where possible — every mating from an N/P1 parent risks producing affected foals.

### PSSM1 Punnett: N/P1 × N/N

Dam gamete: N	
Sire gamete: N	N/N — Clear
Sire gamete: P1	N/P1 — Affected

**PSSM1 Probabilities (N/P1 × N/N):** 50% N/N (Clear); 50% N/P1 (Affected).

### PSSM1 Punnett: N/P1 × N/P1

	Dam gamete: N	Dam gamete: P1
Sire gamete: N	N/N — Clear	N/P1 — Affected
Sire gamete: P1	N/P1 — Affected	P1/P1 — Affected (more severe)

**PSSM1 Probabilities (N/P1 × N/P1):** 25% N/N (Clear); 50% N/P1 (Affected); 25% P1/P1 (Affected, often more severe).

## SCC Susceptibility (example: DDB2 variant)

- Inheritance: **Autosomal recessive** (risk allele often denoted 'a' in literature). - Only a/a horses (two copies) are at significantly higher risk for ocular SCC; N/a are carriers and usually not at-risk. - Environment (UV exposure, periocular pigmentation) strongly modifies risk. - Breeding note: Carriers can be used if mated with clears (N/N) — avoid carrier × carrier matings.

### SCC Punnett: N/a × N/a (Carrier × Carrier)

	Dam gamete: N	Dam gamete: a
Sire gamete: N	N/N — Clear	N/a — Carrier
Sire gamete: a	N/a — Carrier	a/a — At-risk

**SCC Probabilities (N/a × N/a):** 25% N/N (Clear); 50% N/a (Carrier); 25% a/a (At-risk).

### SCC Punnett: N/a × N/N (Carrier × Clear)

Dam gamete: N	
Sire gamete: N	N/N — Clear

Sire gamete: a	N/a — Carrier
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**SCC Probabilities (N/a × N/N):** 50% N/N (Clear); 50% N/a (Carrier).

### **Legend**

- **N** = normal allele (clear)
- **P1** = PSSM1 mutation (dominant)
- **a** = SCC risk allele (recessive)
- **Genotype — Phenotype** format in tables (e.g., N/P1 — Affected).

### **Quick Breeder Notes**

- For **PSSM1**: Preferentially use N/N (clear) breeding stock. Avoid breeding N/P1 if the goal is to eliminate PSSM1 from the line — each mating risks affected offspring. - For **SCC**: Carriers (N/a) can be used cautiously. Always avoid N/a × N/a pairings to prevent a/a at-risk foals. Manage at-risk horses with UV protection and monitor periocular pigmentation and sun exposure. - When in doubt, test both parents before mating and use the Punnett tables above to plan matings that minimise risk.

*Prepared for breeder decision-making. Genetic testing providers and local registry rules may vary; always confirm specific test nomenclature with your lab.*